

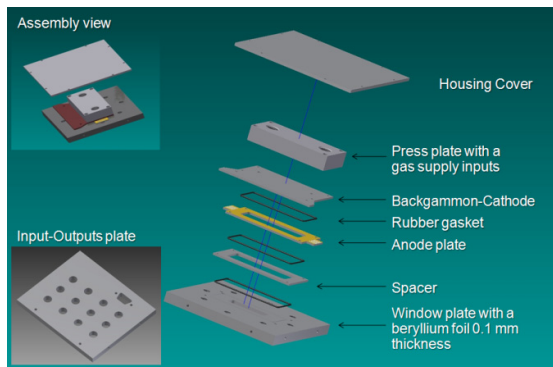
## Construction of four position sensitive proportional counters for soft x-ray spectroscopy\*

*A. Georgiadis and M. Dumchev<sup>#</sup>*

Institute for Product- und Process innovation (PPI), Leuphana University Lueneburg.

**Introduction:** Two crystal spectrometers in a symmetrical set up have been demonstrated at the ESR yet for QED investigations on H, He and Li-like high Z ions. Position sensitive x-ray detectors have been used, a micro-strip germanium for high energy x-rays and CCD based detectors for the soft x-rays. CCD cameras for x-rays show sufficient energy and position but not time resolution according to the requirements ( $< 100$  ns) of ongoing and future experiments within the SPARC collaboration. For these purposes four position sensitive proportional counters have been built.

**Construction of the Detectors:** The detectors are of the backgammon type [H.F. Beyer at all, annual report 1985] where the positions signal is derived by charge division on a split cathode. The main components of the detectors are an anode frame with seven gold-plated tungsten wires with  $\sim 20$   $\mu\text{m}$  diameters, a backgammon cathode made as a printed circuit. The housing of the detector is made of a stainless steel (1.4301, non-magnetic) front plate and aluminium side and rear plates.

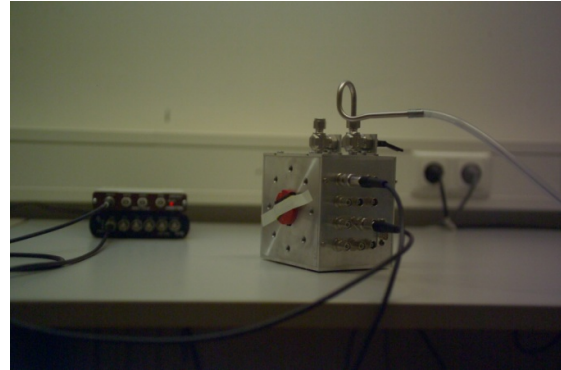


**Figure 1:** Exploded drawing of the detector chamber.

A beryllium foil 0.1mm thickness is used for the entrance window of  $12 \times 40$  mm on the front plate.

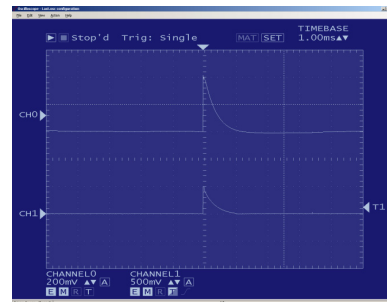
Active Area	$12 \times 40 \times 4$ (mm)
Detection gas	90% Argon+10% CO <sub>2</sub>
Anode wires	Diameter $\sim 20$ $\mu\text{m}$
Windows sizes / material	$12 \times 40$ mm / beryllium
Window thickness	0.1 $\mu\text{m}$
Cathode plate	Printed circuit board
Connector for HV supply	50 ohms SHV
Valve and fittings for gas	Swagelok 316 WHL
Dimension of the housing	105 x 130x 105 (mm)

**Table1:** Mechanical characteristics of the counter



**Figure 2:** Counter overview during first testing.

Figure 2 shows the principal setup with the Fe-55 radiation source fixed at the entrance window during the very first tests of the counter's function. An ORTEC EASY-MCA and a MC USB-1604 are also presented on the picture. The detector operates with an A/CO<sub>2</sub> (90%/10%) mixture at one atmosphere.



**Figure 3:** Oscilloscope screen shot with anode signals, Ch0 after the preamplifier, Ch1 after the amplifier.

### Testing of function and next steps:

The characterisation of the four counters concerning energy, time and position resolution is going on at the moment. A Fe-55 source and standard NIM electronic components are used. In the next step the counters could be integrated into the crystal spectrometer. Furthermore, the development of a new type 3D miniaturized Multi Tube Proportional Counter is planned for the next phase.

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